

What is claimed is:

1 1. A method for storing credit information in a value store module in a
2 value store electric power meter by communication between a host and each
3 terminal through an electric power modem included in the value store electric
4 power meter which is a terminal, comprising the steps of:

5 (a) the host generating first random data, sending the first random data to a
6 terminal, generating a session key by a key generating algorithm using a terminal
7 intrinsic secret key, generating a first signature value by a signature generation
8 algorithm for a comparison during a terminal authentication, and the terminal
9 receiving the first random data and generating the session key by the same
10 method as the host;

11 (b) the terminal generating a second signature value by a signature
12 generating algorithm and second random data and sending the second random
13 data to the host;

14 (c) the host comparing the first and second signature values and
15 authenticating the terminal, the host generating a third signature value and
16 sending the third signature value to the terminal with information on an amount of
17 money when the terminal is authenticated and the terminal receiving the third
18 signature value and the information on the amount of money from the host,
19 generating a fourth signature value, and authenticating the host by comparing the
20 third and fourth signature values with each other; and

21 (d) the terminal increasing the value by decoding the information on the
22 amount of money and sending the value obtained by encrypting a balance and a
23 terminal ID using an encrypting algorithm to the host and the host receiving the
24 encrypted value, decoding the encrypted value, comparing the stored terminal ID
25 with the decoded terminal ID, authenticating the terminal once again, and backing
up the balance in a record file when the authentication is completed.

1 2. The method of claim 1, further comprising an electric power charge
2 system conversion step including the sub-steps of:

3 (a1) the host generating first random data, sending the first random data to
4 a terminal, generating a session key by a key generating algorithm using a

5 terminal characteristic secret key, generating a first signature value by a signature
6 generation algorithm for a comparison during a terminal authentication, and a
7 terminal receiving the first random data and generating the session key by the
8 same method as the host;

9 (b1) the terminal generating a second signature value by a signature
10 generating algorithm and second random data and sending the second random
11 data to the host;

12 (c1) the host comparing the first and second signature values and
13 authenticating the terminal, the host generating a third signature value and
14 sending the third signature value to the terminal with mode information when the
15 terminal is authenticated and the terminal receiving the third signature value and
16 the mode information from the host and generating a fourth signature value; and

17 (d1) the terminal authenticating the host by comparing the third and fourth
18 signature values with each other, and the terminal converting a rate system,
19 generating an encrypted value obtained by encrypting the mode information and
20 the terminal ID using the encrypting algorithm and sending the encrypted value to
21 the host and the host receiving the encrypted value, decoding the encrypted value,
22 comparing the stored terminal ID with the decoded terminal ID, authenticating the
23 terminal once again, and backing up the balance in a record file when the
24 authentication is completed.

1 3. The method of claim 2, further comprising a use information check
2 command step including the sub-steps of:

3 (a2) the host generating first random data, sending the first random data to
4 a terminal, generating a session key by a key generating algorithm using a
5 terminal characteristic secret key, generating a first signature value by a signature
6 generation algorithm for a comparison during a terminal authentication, and a
7 terminal receiving the first random data and generating the session key by the
8 same method as the host;

9 (b2) the terminal generating a second signature value by a signature
10 generating algorithm and second random data and sending the second random
11 data to the host;

(c2) the host comparing the first and second signature values and authenticating the terminal, the host generating a third signature value and sending the third signature value to the terminal with time information when the terminal is authenticated and the terminal receiving the third signature value and the time information from the host, generating a fourth signature value; and

(d2) the terminal authenticating the host by comparing the third and fourth signature values with each other, and the terminal sending the value obtained by encrypting a logfile of use details using the encrypting algorithm and sending the encrypted value to the host and the host receiving the encrypted value, decoding the encrypted value, comparing the stored terminal ID with the decoded terminal ID, authenticating the terminal once again, and backing up information on use during days, weeks, and months and a timer in a record file when the authentication is completed.

4. A value store electric power meter including an electric power line input and output terminal for measuring the amount of used electric power, comprising:

an electric power consumption operating portion for measuring the voltage and current of an electric power line and calculating used electric power;

an electric power modem for performing data communication between the host and the terminal through the electric power line;

a secure storing portion including a secure access module (SAM) having a CPU and an encryption key and an encryption algorithm for storing value and a store value module (SVM) for storing value, for preventing the fraudulent use of the value information and hacking, excluding a cryptographical attack, and requiring the authorization process of the SAM in requesting a token from the SVM;

an on/off latch relay switch for breaking the supply of electric power according to the balance result of the SVM; and

a token exchanger for reducing a token from the value information input from the SVM according to the amount of electric power consumed per unit time,

18 the SVM requesting a new token to a token tank when an inner token is
19 exhausted.

1 5. The value store electric power meter of claim 4, further comprising
2 an IC card reading and recording portion to allow use with other meters such as
3 water, gas, and calory meters by inserting an IC card into the electric power
4 meter, receiving value from the host on-line, recording the received value on the
5 inserted IC card, and reading the received value from the IC card.

1 6. The value store electric power meter of claim 5, wherein the IC card
2 reading and recording portion is applied to water, gas, and heat meters employing
3 an IC card method operated in an off-line state by recording added value for
4 things such as gas and water in the IC card through the electric power modem, by
5 which it is possible to store electric power value in the IC card by including a
6 communication port comprised of eight terminals defined by the ISO 7816 Part 2
7 having Vcc, Clk, DIO, Reset, and Gnd for synchronously and asynchronously
8 communicating with the IC card.

1 7. The value store electric power meter of claim 4, further comprising:
2 an AC/DC converter for supplying an operation voltage required by the
3 electric power meter;

4 a power consumption sensor for sensing that the electric power is normally
5 used when the output of a sensor is "0" and that terminals are bypassed and the
6 electric power is surreptitiously used when the output of the sensor is "1"; and

7 a buzzer for generating an audible alarm and guiding a user to perform
8 value transfer and storage when a last token is received by requesting a new
9 token from the SVM after the balance of the token exchanger is exhausted.

1 8. The value store electric power meter of claim 4, wherein the electric
2 power consumption operating portion comprises:

3 a shunt resistor for measuring an amount of AC current;

4 a voltage divider for serially connecting two resistors and selecting from a
5 voltage range given by the ratios of the two resistors in order to adjust the AC
6 voltage of the electric power line within the range of the input voltage of a voltage
7 meter;

8 an analog to digital converter for converting an AC current signal which
9 flows through the shunt resistor into a digital signal of 16 or 20 bits; and

10 an analog to digital converter for converting an AC voltage into a digital
11 signal of 16 bits,

12 wherein the phase of the voltage is compared with the phase of the current
13 and an angle by which the two phases are different from each other is calculated
14 and output as a signal for applying differential rates.

1 9. The value store electric power meter of claim 4, further comprising
2 an electric power consumption table which is an electric power fee mode table for
3 differentially applying multiple step electric power use rates such as 50%, 75%,
4 100%, 150%, and 200% according to electric power supply and demand states on
5 the basis of a real time clock comprised of year, month, time, minute, and second.

1 10. The value store electric power meter of claim 4, comprising a non-
2 volatile memory storing a characteristic 3 byte ID number and recording an electric
3 power use state during a certain period of hours, days, or months for remotely
4 monitoring the surreptitious or abnormal use of electric power and performing an
5 electronic sealing function.

1 11. The value store electric power meter of claim 4, comprising an LCD
2 display for visually displaying the balance of the value, the transfer state of the
3 value, the real time electric power consumption status, and the accumulative
4 electric power use states.

1 12. The value store electric power meter of claim 5, wherein the value
2 store electric power meter which can be used for simple and sound fee payment
3 means by a SET electronic commercial transaction process using next generation

credit and direct payment cards of EMV '96 mixed with the IC card reader and recorder, further comprises:

means such as a telephone, an Internet, a P-ATM (EMV '96), and a digital interphone for performing audio communication with a person in charge of the host server or transmitting an audible message to help the user with matters such as storage; and

a keypad for a user directly requesting the value to be stored.

13. The value store electric power meter of claim 4, wherein the electric power input and output terminal of the electric power meter comprising a cover and physical sealing for preventing physical tapping, prevents the surreptitious and abnormal use of electric power.

14. The value store electric power meter of claim 4, further comprising an arrester circuit for absorbing lightning or a surge voltage on an electric power line of a supplier.

15. The value store electric power meter of claim 4, wherein the electric power line of a transformer for reducing 3.3KV to a generally used voltage of 110V/220V/240V further comprises a current transformer for measuring the total amount of current,

wherein the electric power meter is network connected to local service & surveillance units (LSs) having power modems for communicating with a maximum of 256 value store electric power meters on the electric power line and an area service & surveillance unit (AS) for managing a maximum of 256 LSs.

16. The value store electric power meter of claim 15, wherein the host further comprises a server for an electric power seller and an electric power reseller for issuing an IC card to a subscriber with the use of an IC card having a master key, automatically transferring value when the subscriber requests the value to be stored, monitoring and managing the legal use of the value of the

6 subscriber, totaling and analyzing the detailed electric power status of the
7 subscriber, thus re-determining a price in purchasing the electric power,
8 wherein each server connected to a plurality of ASs manages and monitors
9 the value transfer and store electric power meter which can be connected to the
10 ASs and LSs in a tree structure and stores value in the value transfer and store
11 electric power meter.

1 17. The value store electric power meter of claim 15, further comprising
2 a voltage divider, a voltage analog-to-digital converter, a current analog-to-digital
3 converter, a latch relay, and a shunt resistor so that if at least two kinds of electric
4 power sources selectively use other voltages or simultaneously use at least two
5 kinds of voltages, it is possible to separately measure and operate the respective
6 amounts of current.